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ABSTRACT

This report presents data and analyses concerning black participants in two nationwide surveys of science achievement conducted by the National Assessment of Educational Progress (NAEP) during 1969-70 and 1972-73. In both assessments, NAEP selected respondents aged 9, 13, and 17 using a deeply-stratified, multi-stage probability sample. In addition to estimates of performance for age level, performance data are also included for groups categorized by sex, race, region of the country, and size and type of community. (MH)

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CHANGES IN SCIENCE ACHIEVEMENT OF BLACK STUDENTS

by

Judith M. Sauls and John Michael Kalk

National Assessment of Educational Progress

Paper presented at annual convention of American Educational Research Association, San Francisco, April, 1976.

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Changes in Science Achievement of Black Students

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Judith M. Sauls and John Michael Kalk
National Assessment of Educational Progress

National Assessment of Educational Progress, funded by the National Center for Educational Statistics, has been monitoring the nation's progress in education in response to a charge set before the Office of Education in 1867. More than 100 years later, in 1969, National Assessment first began collecting data for reporting on the nation's progress in education. This paper outlines the results found to date in the area of science for the nation as a whole and in particular for black students.

The first assessment of science took place in 1969-70 and the second in 1972-73. In both assessments information was gathered on national samples of young students aged 9, 13 and 17 who were categorized by region, sex, race and size and type of community.[1] Since identical questions were included in both assessments, National Assessment has information on how knowledge of fundamental facts and principles and their application changed in the area of science from 1969 to 1973 for these groups.

At each age the national results showed a general average decline in performance on these science achievement questions.[2]

[1]The assessment schedules varied for each age. The actual dates were:

9-year-olds	January-February, 1970	January-February, 1973
13-year-olds	October-December, 1969	October-December, 1972
17-year-olds	March-May, 1969	March-May, 1973

[2]For highlights of the national results see National Assessments of Science, 1969 and 1973: A Capsule Description of Changes in Science Achievement, Science Report No. 04-S-00, February, 1973, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

The Samples Used

In both assessments of science, National Assessment selected respondents aged 9, 13 and 17 using a deeply-stratified, multi-stage probability sample.[3] The assessments were not longitudinal: different individuals participated in each of the assessments. In 1969-70 an average of 21,400 students participated nationally at each age level. In 1972-73 about 22,700 per age participated nationally. By weighting each respondent's performance inversely to his or her probability of selection, National Assessment can make appropriate generalizations to the entire population of 9-year-olds, 13-year-olds, and 17-year-olds. Thus each piece of data reported by National Assessment is an estimate of a corresponding population value, that is, as if all 9-year-olds had responded. In addition to reporting estimates of performance for each age, National Assessment also estimates performance for groups of respondents categorized by sex, race, region of the country and size and type of community.

This paper focuses on the science achievement of National Assessment respondents classified as black. This classification was done visually by exercise administrators in both assessments. Unequal probabilities of selection were used in both assessments to insure adequate representation of schools in low-income areas. The actual numbers of black respondents selected, as shown in Table 1 and as discussed below, do not reflect the correct proportion of black students in the population. Correctly weighted proportions are shown in Table 2.

[3]For more information see Moore, R. P., Chromy, J. R. and Rogers, W. T. The National Assessment approach to sampling. Denver: National Assessment of Educational Progress, 1974.

Table 1

Numbers of Black Respondents Participating in Each Science Assessment 1969 - 1973

	Age 9		Age 13		Age 17	
	1970	1973	1969	1972	1969	1973
National (Whites, Blacks and Other Races)	19,468	18,638	21,708	23,507	22,926	25,865
Blacks	3,119	3,265	3,741	3,922	2,610	3,936
Region[a]						
Northeast	495	657	680	734	647	580
Southeast	1,472	1,523	1,739	1,908	1,113	1,971
Central	575	694	634	741	478	807
West	577	391	688	539	372	578
Sex[a]						
Males	1,567	1,508	1,729	1,889	1,114	1,758
Females	1,552	1,757	1,984	2,033	1,469	2,178
Size and Type of Community[a]						
Low Metro	977	1,172	1,179	1,138	863	1,168
Big City	705	646	948	896	569	769
Medium City	336	413	469	522	341	545
Small Place	1,101	1,034	1,145	1,366	837	1,454

[a]Counts are for black students only.

Table 2

The Weighted Percentage of Black Respondents Participating in Each Science Assessment 1969 - 1973

	Age 9		Age 13		Age 17	
	1970	1973	1969	1972	1969	1973
Region						
Northeast	16.6%	21.4%	18.4%	20.7%	22.0%	16.8%
Southeast	44.9	43.2	44.9	41.4	36.6	40.4
Central	23.3	24.3	20.9	23.8	22.6	26.6
West	15.2	11.1	15.8	14.2	18.8	16.2
Sex						
Males	49.8%	46.5%	47.2%	48.4%	43.8%	44.3%
Females	50.2	53.5	52.8	51.6	56.2	55.7
Size and Type of Community						
Low Metro	28.0%	35.9%	34.0%	26.1%	34.6%	31.9%
Big City	24.7	23.4	24.3	29.1	21.0	25.8
Medium City	10.5	12.6	12.6	14.7	13.1	12.9
Small Place	36.8	28.1	29.1	30.1	31.3	29.5

The total number of black students participating in the first assessment was 9470 for an average of 3157 per age. At age 9 these selected black respondents represented 12.0% of the nation's 9-year-olds. At age 13 the sampled blacks represented 13.3% of the nation's 13-year-olds and at age 17 blacks represented 9.6% of the in-school age 17 population.

The number of black students participating in the second assessment was larger, in part due to slightly better sampling procedures. A total of 11,123 black students participated in the second assessment, an average of 3708 per age. These selected black participants represented 14.4% of the nation's 9-year-olds, 12.6% of the nation's 13-year-olds and 12.0% of the 17-year-olds attending school.

National Assessment also categorized students by the region in which they lived: Northeast, Southeast, Central or West. The map shown below indicates the states in each of these regions.

About 42% of all blacks lived in the Southeast. About 24% lived in the Central region while about 19% lived in the Northeast. The remainder of the blacks, about 15%, lived in the Western region.

The proportions of black boys and girls varied slightly from age to age and from 1969-70 to 1972-73, as shown in Table 2. In general, black girls outnumbered black boys in both assessments and the ratio of girls to boys in school tended to increase with age.

National Assessment used seven size and type of community categories to describe the communities in which the respondents' schools were located. In this paper these seven categories were collapsed into four, due to the small numbers of blacks in some of the categories. These four collapsed categories are defined below.

Low Metro. These schools were located in cities or urbanized areas of cities with size over 200,000, based on 1970 Census Bureau information, and were among the highest on National Assessment's extreme inner city index, characterized by a high proportion of residents on welfare or unemployment and a low proportion from professional or managerial positions. About 32% of all blacks attended schools in these Low Metro areas.

Big City. The remaining schools found in cities or urbanized areas of big cities with 1970 population greater than 200,000, excluding those classified as Low Metro, were classified as Big City schools. About 25% of the black students attended schools in the Big City category.

Medium City. Schools in this category were in cities with 1970 population between 25,000 and 200,000 but not part of the urbanized areas of big cities. This was the smallest category for blacks with about 13% attending schools in Medium Cities.

Small Place. These schools were located in open country or cities of size less than 25,000, excluding small cities within the urbanized areas of big cities. Schools in Small Places contained about 31% of all black students.

The Exercises Used

The exercises used to report change in science achievement were originally written for the first assessment of science administered in 1969-70. About half of the exercises used in that assessment were not released to the public so that they could be used in the second assessment of science to measure change. There were 92 such exercises at age 9, 67 at age 13 and 64 at age 17. After the second assessment, about two-thirds of these exercises were released.[4] The remaining one-third of these exercises will be used in the next assessment of science, currently scheduled for 1976-77, to monitor change over three points in time.

When these change exercises were classified by type of science, the majority were from the physical sciences:

	Physical Science	Biological Science	Other	Total
Age 9	50	27	15	92
Age 13	36	23	8	67
Age 17	39	20	5	64

[4]These can be found in Changes in Science Performance, 1969-1973: Exercise Volume, Science Report No. 04-S-20, December, 1975, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

All but one of these exercises were multiple choice. The one open-ended exercise used the same scoring guide for both assessments and the responses from both assessments were scored at the same time using the same scorers. The science change exercises measured knowledge, understanding and application of the fundamental facts and principles of science covering such topics as the structure of the atom, weather, animals, plants, the size of the universe, fossils, health, the principles of mechanics, nutrition, physiology, the scientific enterprise and reading graphs.

Data Analysis

National Assessment did not use a "test" that contained all science exercises for an age. Instead, each respondent took only a fraction of the total number of exercises, spending about 50 minutes on the task. Total "test" scores for individuals were not calculated; rather, estimates of the nation or group proportion correct on each exercise were calculated by weighting each sample response. For example, an estimated 44% of all 13-year-olds and 34% of black 13-year-olds could answer this question [1011262] correctly in 1969:

What is the main way that sweating helps your body?

- ○ It keeps your skin moist.
- ○ It keeps you from catching cold.
- ○ It rids your body of extra water.
- ○ It gets rid of the salt in your body.
- ● It aids in controlling body temperature.
- ○ I don't know.

10

To estimate change on each exercise the 1969-70 percentage correct was subtracted frm the 1972-73 percentage correct. For example, since only 43% of all 13-year-olds responded correctly to the above exercise in 1972, there was a national decline of one percentage point on this exercise. Similarly, black 13-year-olds also showed a slight decline in correct responses, down three percentage points in 1972. These percentages are displayed in Figure 1.

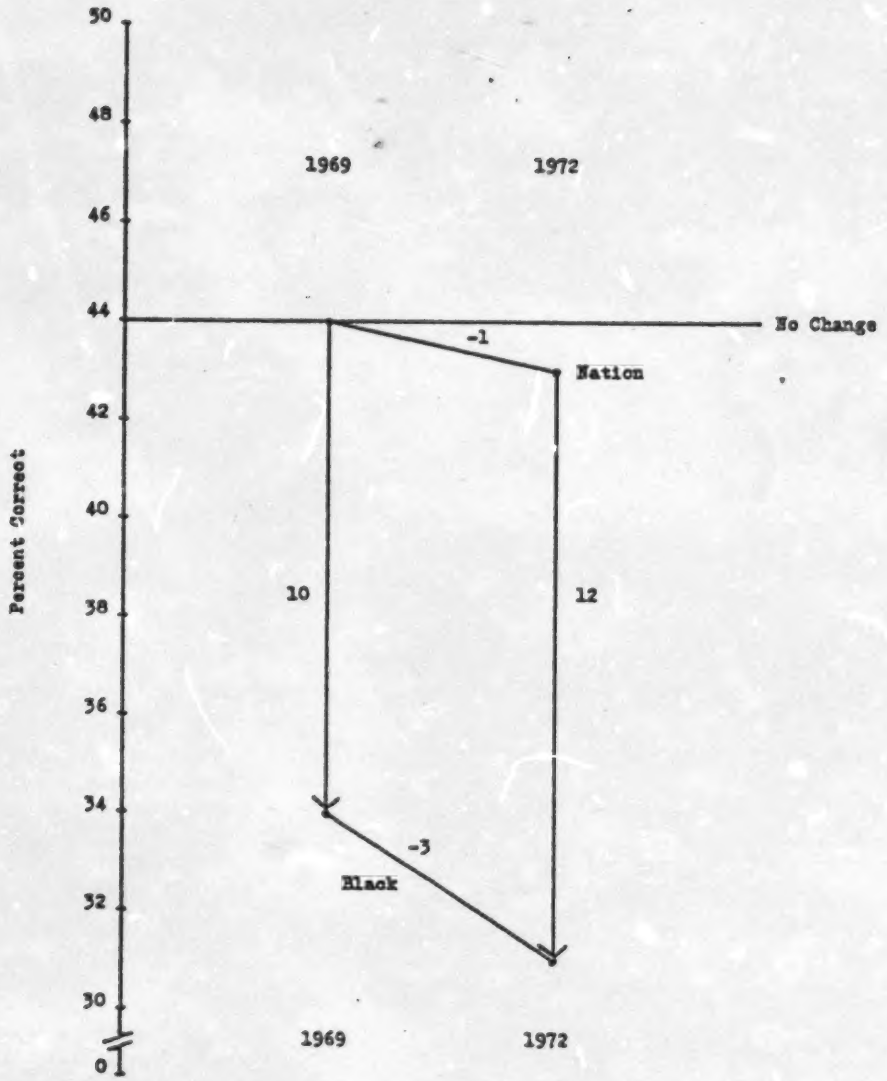
In addition to looking at changes in the percentage correct on an exercise, it is also interesting to determine how a group changed its relative position from the first to the second assessment. In 1969 the black 13-year-olds were 10 percentage points below the nation in correct responses on the above exercise. In 1972 they were 12 percentage points below. Thus even though both the nation as a whole and blacks did not perform as well in 1972 as they did in 1969, the difference between blacks and the nation increased slightly on this exercise due to the slightly larger decline in black performance.

The mean was used to summarize the correct percentages over exercises. Thus a mean percentage correct of 53% would indicate that on a typical repeated science exercise 53% of the age level responded correctly. For each mean a standard error was calculated using the jackknife procedure[5] which can be used to estimate the stability of the mean. In general, the larger the number of respondents, the smaller the standard error.

[5]Miller, R. G., Jr. The jackknife--A review. Biometrika, 1974, 61, 1-15.

Figure 1

An Example of Change in 13-Year-Old Black and National Performance on Exercise 101126-2, 1969 - 1972



Mean percentages correct and their standard errors are presented in Tables 3, 4 and 5 with one table per age. In each table science change results are summarized for blacks classified by region, sex and size and type of community.

Table 3

Mean Percentage Correct for Age 9 Black Students
on 92 Science Change Exercises
(Standard Errors in Parentheses)[a]

	Mean % Correct 1970	Mean % Correct 1973	Mean Change[b]
Total (All Blacks)	47.0(0.8)	46.1(0.4)	-0.9(0.9)
Region			
Northeast	52.6(1.2)	48.3(0.8)	-4.3(1.5)
Southeast	41.7(0.6)	44.5(0.5)	2.8(0.8)
Central	51.1(2.6)	46.8(1.2)	-4.3(2.8)
West	48.4(1.4)	46.4(1.3)	-1.9(1.8)
Sex			
Male	46.7(0.9)	46.5(0.5)	-0.3(1.0)
Female	47.3(0.9)	45.7(0.5)	-1.6(1.1)
Size and Type of Community			
Low Metro	43.5(1.2)	44.8(0.9)	1.3(1.5)
Big City	50.5(1.7)	48.0(1.0)	-2.5(2.0)
Medium City	47.8(1.8)	47.2(1.1)	-0.5(2.1)
Small Place	47.0(1.5)	45.7(0.4)	-1.3(1.5)

[a]All standard errors in this table are rounded figures. The standard error of change is calculated from the 1969-70 standard error (SE_1) and the 1972-73 standard error (SE_2) using the formula

$(SE_1^2 + SE_2^2)^{\frac{1}{2}}$.

[b]The mean change is the mean of the changes in performance for the exercises. The mean change is equal to the difference in the means of each year, but may differ in this chart due to rounding.

Table 4

Mean Percentage Correct for Age 13 Black Students
on 67 Science Change Exercises
(Standard Errors in Parentheses)[a]

	Mean % Correct 1969	Mean % Correct 1972	Mean Change[b]
Total (All Blacks)	44.9(0.6)	41.7(0.6)	-3.2(0.8)
Region			
Northeast	48.0(1.7)	43.6(1.8)	-4.4(2.5)
Southeast	42.4(0.8)	41.3(0.6)	-1.1(1.0)
Central	47.6(1.1)	41.1(1.1)	-6.5(1.5)
West	46.0(1.1)	41.8(1.7)	-4.2(2.1)
Sex			
Male	46.6(0.7)	43.0(0.7)	-3.7(1.0)
Female	43.4(0.8)	40.4(0.7)	-3.0(1.0)
Size and Type of Community			
Low Metro	44.3(0.9)	38.0(0.8)	-6.3(1.2)
Big City	47.7(1.5)	45.2(0.9)	-2.5(2.1)
Medium City	44.7(2.0)	40.2(1.3)	-4.5(2.3)
Small Place	43.4(1.0)	42.5(0.8)	-0.9(1.3)

[a]All standard errors in this table are rounded figures. The standard error of change is calculated from the 1969-70 standard error (SE_1) and the 1972-73 standard error (SE_2) using the formula

$(SE_1^2 + SE_2^2)^{\frac{1}{2}}$.

[b]The mean change is the mean of the changes in performance for the exercises. The mean change is equal to the difference in the means of each year, but may differ in this chart due to rounding.

Table 5

Mean Percentage Correct for Age 17 Black Students
on 64 Science Change Exercises
(Standard Errors in Parantheses)[a]

	Mean % Correct 1969	Mean % Correct 1973	Mean Change[b]
Total (All Blacks)	33.9(0.7)	32.0(0.6)	-1.9(0.9)
Region			
Northeast	35.0(1.3)	33.0(1.0)	-1.9(1.6)
Southeast	32.6(1.1)	31.4(0.7)	-1.2(1.3)
Central	34.0(1.5)	32.5(1.6)	-1.6(2.2)
West	35.4(2.4)	31.4(1.0)	-4.0(2.6)
Sex			
Male	36.3(0.9)	33.4(0.7)	-2.9(1.1)
Female	32.1(0.8)	30.9(0.7)	-1.1(1.1)
Size and Type of Community			
Low Metro	32.5(1.0)	29.9(1.3)	-2.6(1.6)
Big City	36.4(1.5)	34.0(1.1)	-2.5(1.9)
Medium City	35.6(1.8)	32.2(1.2)	-3.3(2.1)
Small Place	32.7(1.3)	32.7(0.7)	-0.1(1.4)

[a]All standard errors in this table are rounded figures. The standard error of change is calculated from the 1969-70 standard error (SE_1) and the 1972-73 standard error (SE_2) using the formula

$(SE_1^2 + SE_2^2)^{\frac{1}{2}}$.

[b]The mean change is the mean of the changes in performance for the exercises. The mean change is equal to the difference in the means of each year, but may differ in this chart due to rounding.

National Results

The average performance of students aged 9, 13 and 17 as measured by the National Assessments of science in 1969-70 and 1972-73 showed a downward trend for both the nation and for black students. At age 9 the national mean percentage correct for the 92 science change exercises went from 61.1 in 1970 to 59.4 in 1973 for a mean decline of 1.7 percentage points. Similarly, the average performance of 9-year-old black students went from 47.0 to 46.1 for an average decline of 0.9 percentage points. As a result of the smaller declines in performance, difference between 9-year-old blacks and the nation was smaller in 1973 than in 1970.

At age 13 the average performance of black students declined more than the national performance. The national mean percent correct for the 67 exercises went from 60.2 in 1969 to 58.3 in 1972 for a mean decline of 1.9 percentage points while black performance went from 44.9 to 41.7 for a mean decline of 3.2 percentage points. Thus, at age 13 the black students' position relative to the nation was slightly lower in 1972 than in 1969.

Seventeen-year-old black students followed the same trend as the 9-year-olds. In the nation the mean percent correct for the 64 exercises went from 45.6 in 1969 to 42.3 in 1973 for a mean decline of 3.2 percentage points, but black students showed smaller declines. Their performance went from 33.9 to 32.0 for a mean decline of 1.9 percentage points. Therefore, these black students had a better relative position in 1973 than in 1969.

For all ages the absolute performance of black students, as for the nation as a whole, declined from 1969-70 to 1972-73. But at ages 9 and 13 the average relative performance of black students improved 1 percentage point when compared to the nation. Since these were only slight gains and since 13-year-olds actually declined 1 percentage point with respect to the nation, it appears that the differences between black and national performance remained fairly stable from 1969 to 1973.

Regional Results

Regional differences among black students at each age are displayed graphically in Figures 2, 3 and 4. With one exception, 9-year-old black students in the Southeast, regional performance of blacks on the two assessments of science paralleled the declines seen for black students in general.

The notable result for age 9 was the increase in performance of blacks in the Southeast. These students produced the lowest relative performance of all regions for both assessments but had a mean increase of 2.8 percentage points across the two assessments. In comparison, the Northeast which had the highest performance of all regions declined 1.3 percentage points. Students in the Central and West regions fell between these two extremes in performance but their mean performance declined just like the Northeastern students. Thus, the performance of the students in the extreme groups converged during the two assessments and Southeast 9-year-olds appear to have reduced the difference between their performance and the performance of black students in other regions.

The results for age 13 were not as dramatic as age 9 because without exception, performance declined for all four regional groups. In the first assessment 13-year-old blacks displayed performance similar to that seen for 9-year-olds where the highest performance was in the Northeast and the lowest in the Southeast. However, for the second assessment, Central performance was the lowest, Southeastern and Western performance was only slightly better, and Northeastern performance was the highest. Even though the Southeastern performance declined 1.1 percentage points, its

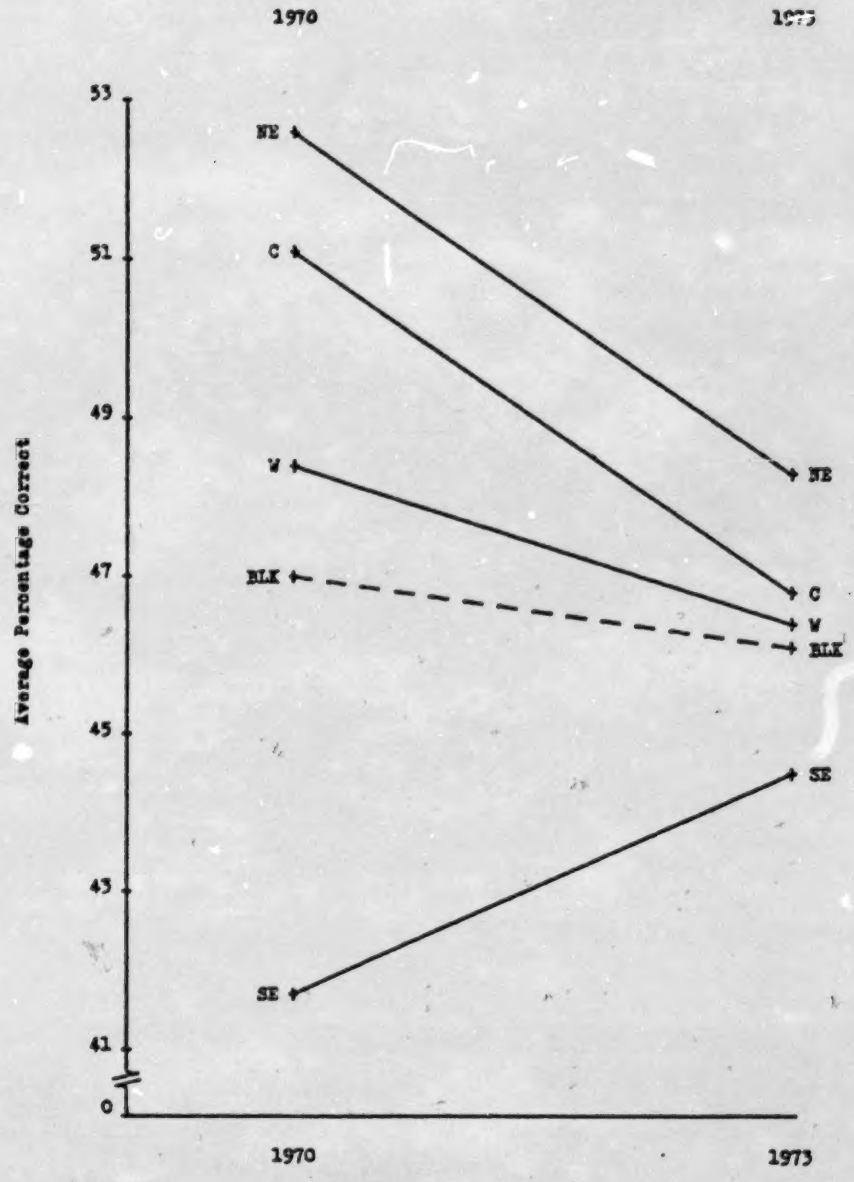
relative position improved with respect to the other regions because the Northeast, Central and West declined 4.4, 6.5 and 4.2 percentage points respectively.

At age 17 the results were similar to age 13. In the Southeast, blacks had an average decline of 1.2 percentage points while Northeast, Central and West blacks had larger declines of 1.9, 1.6 and 4.0 percentage points respectively. Compared to the other regions, the Southeastern blacks improved their relative position over the two assessments. As at ages 9 and 13, 17-year-old Southeastern blacks performed the lowest of all regions. But, this time the highest performing group in the first assessment was the West closely followed by the Northeast. During the second assessment the Northeast showed its usual best performance of all the regions.

Typically the Northeastern blacks performed better than all other regions and Southeastern blacks performed the lowest. But, while Northeast, Central and West average performance levels declined at all three ages between 1969 and 1973, Southeastern performance depended upon age. At age 9 the performance in the Southeast actually improved and for ages 13 and 17 their performance did not decline as much as the other regions. At all ages, then, Southeastern blacks improved their position relative to the other three regions.

Figure 2

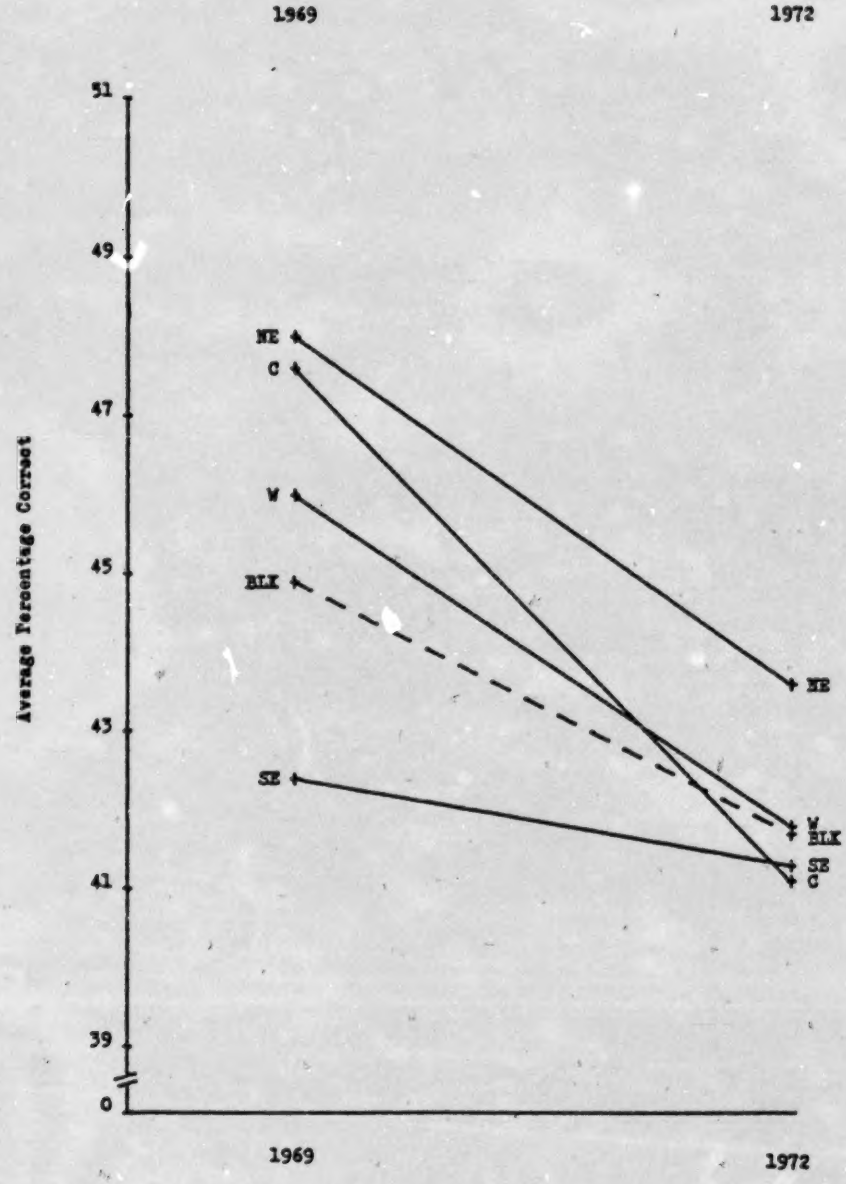
Average Percentages Correct for 9-Year-Old Blacks
by Region, 1970 and 1973



BLK = Black 9-year-olds
NE = Northeast
SE = Southeast
C = Central
W = West

Figure 3

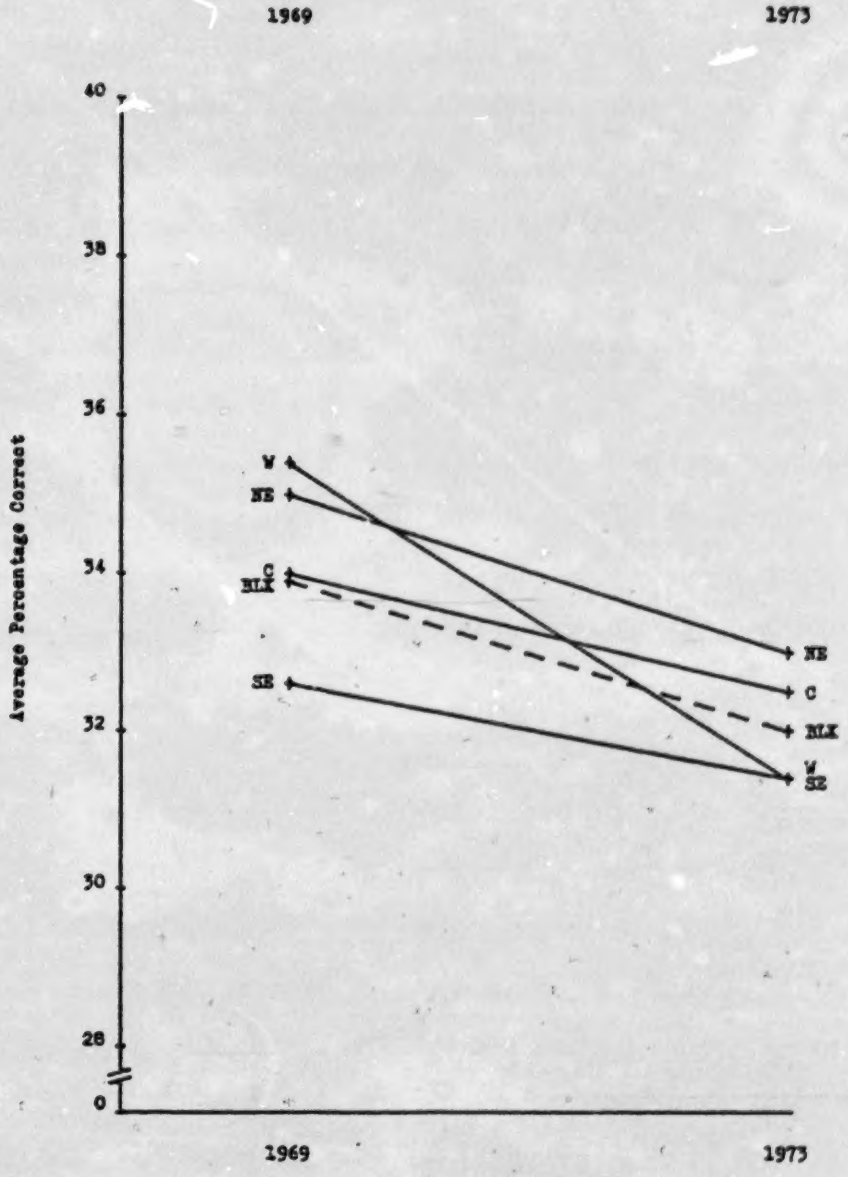
Average Percentages Correct for 13-Year-Old Blacks by Region, 1969 and 1972



BLK = Black 13-year-olds
NE = Northeast
SE = Southeast
C = Central
W = West

Figure 4

Average Percentages Correct for 17-Year-Old Blacks by Region, 1969 and 1973



NLX = Black 17-year-olds
NE = Northeast
SE = Southeast
C = Central
W = West

Results for Boys and Girls

In general, black boys and girls showed average declines between the first and second assessments of science. At ages 13 and 17 boys performed better than girls in both science assessments and both sexes showed declines similar to the declines seen for all blacks. At age 9 boys and girls changed relative positions from the first to the second assessments although in both assessments the differences between them were very slight. In general, the differences between boys' and girls' performance in science tended to increase with age as shown in Figures 5, 6 and 7.

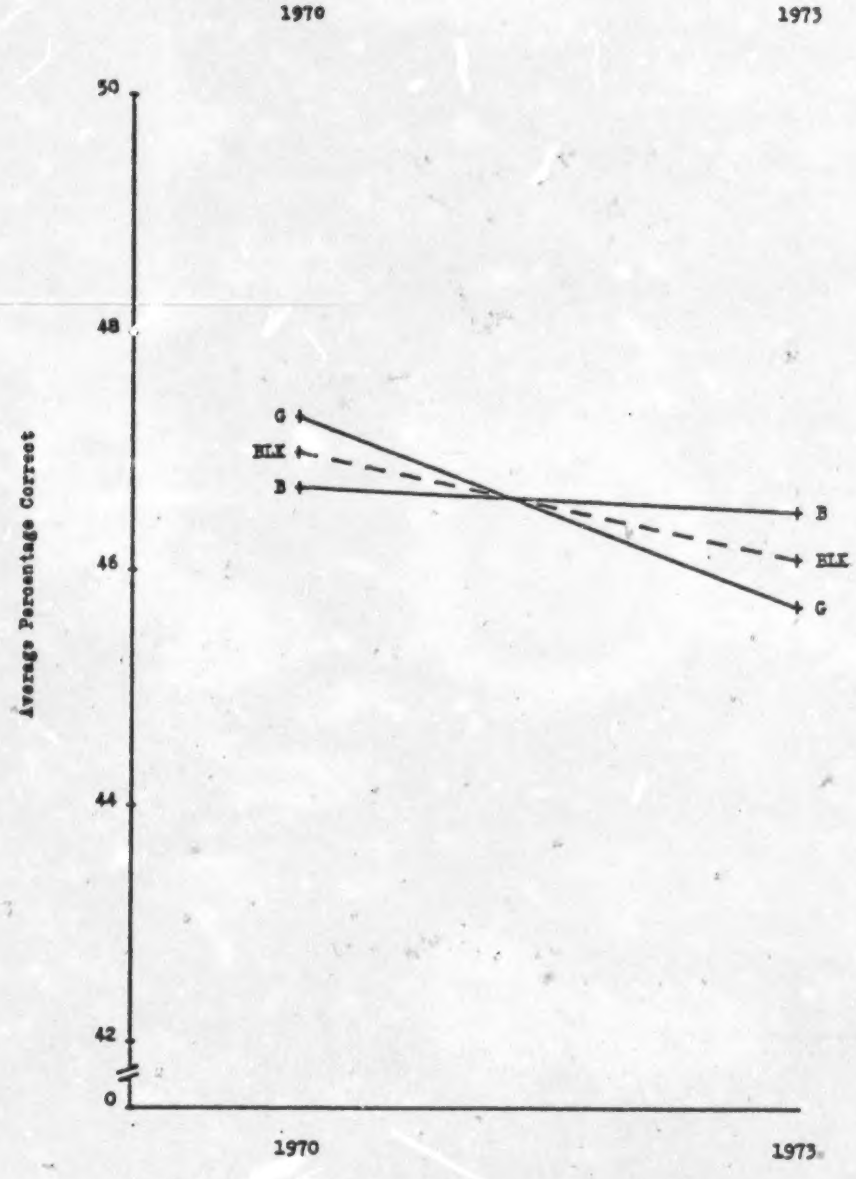
At age 9 black girls had a slight advantage over black boys in the first assessment: an average of 47.3 percent of the girls responded correctly compared to 46.7 percent correct for boys. In the second assessment they reversed positions. The boys' average percentage correct, which declined 0.3 percentage points, was close to that of the first assessment. Girls, however, showed a decline of 1.6 percentage points, putting their performance slightly below that of boys. The girls' larger declines account for their lowered position in the second assessment.

At age 13 black boys outperformed black girls in both assessments. In 1969 boys outperformed girls by an average of 3.2 percentage points. Similarly, in 1972 boys were an average 3.4 percentage points higher than girls. Thus boys maintained their advantage from 1969 to 1972. Both 13-year-old groups showed similar declines in performance: boys declined by an average of 3.7 percentage points and girls declined by an average of 3.0 percentage points.

The gap between black boys and black girls was also noticeable at age 17. In the first assessment boys outperformed girls by an average of 4.2 percentage points, the largest difference of any age. However, that lead narrowed to 2.5 percentage points in the second assessment. This was mainly due to the larger drop in boys' performance, down 2.9 percentage points, when compared to that of girls, down 1.1 percentage points.

Figure 5

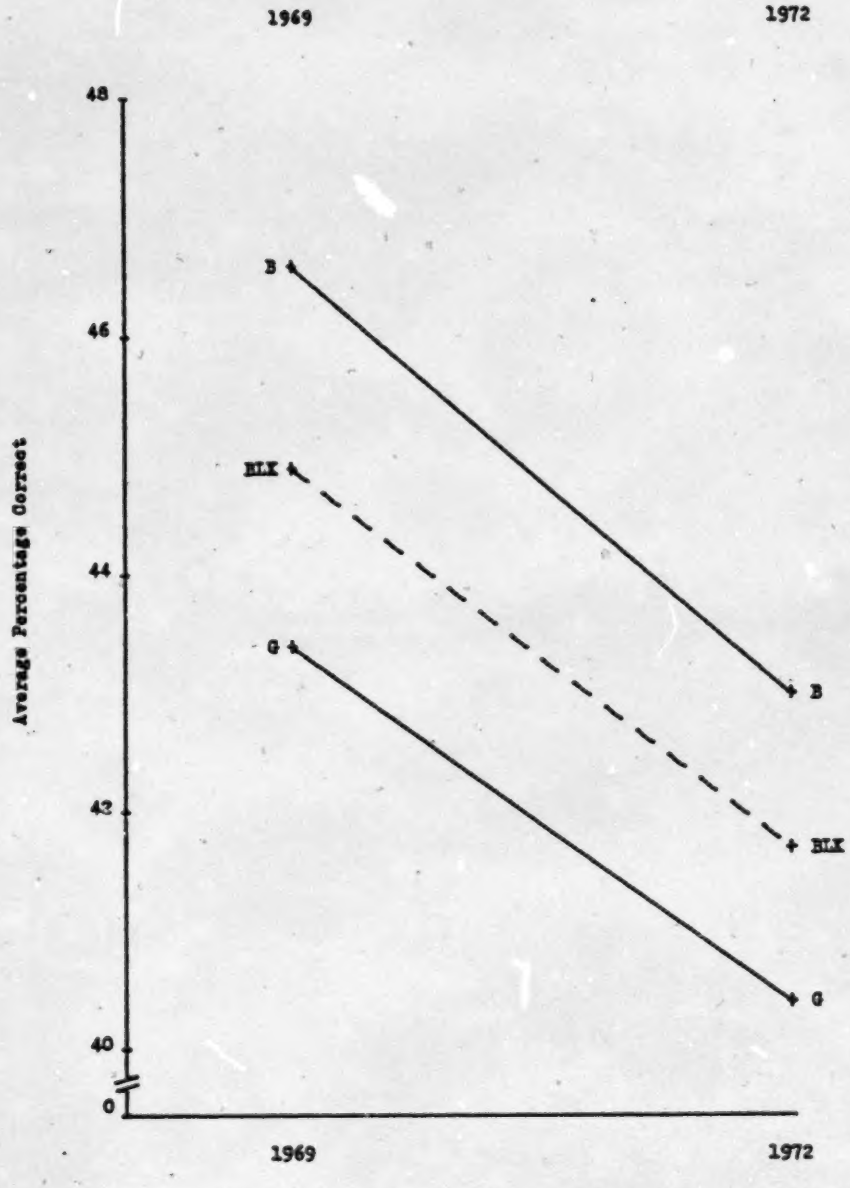
Average Percentages Correct for Black Boys and Girls Aged 9. 1970 and 1973



BLK = Black 9-year-olds
B = Boys
G = Girls

Figure 6

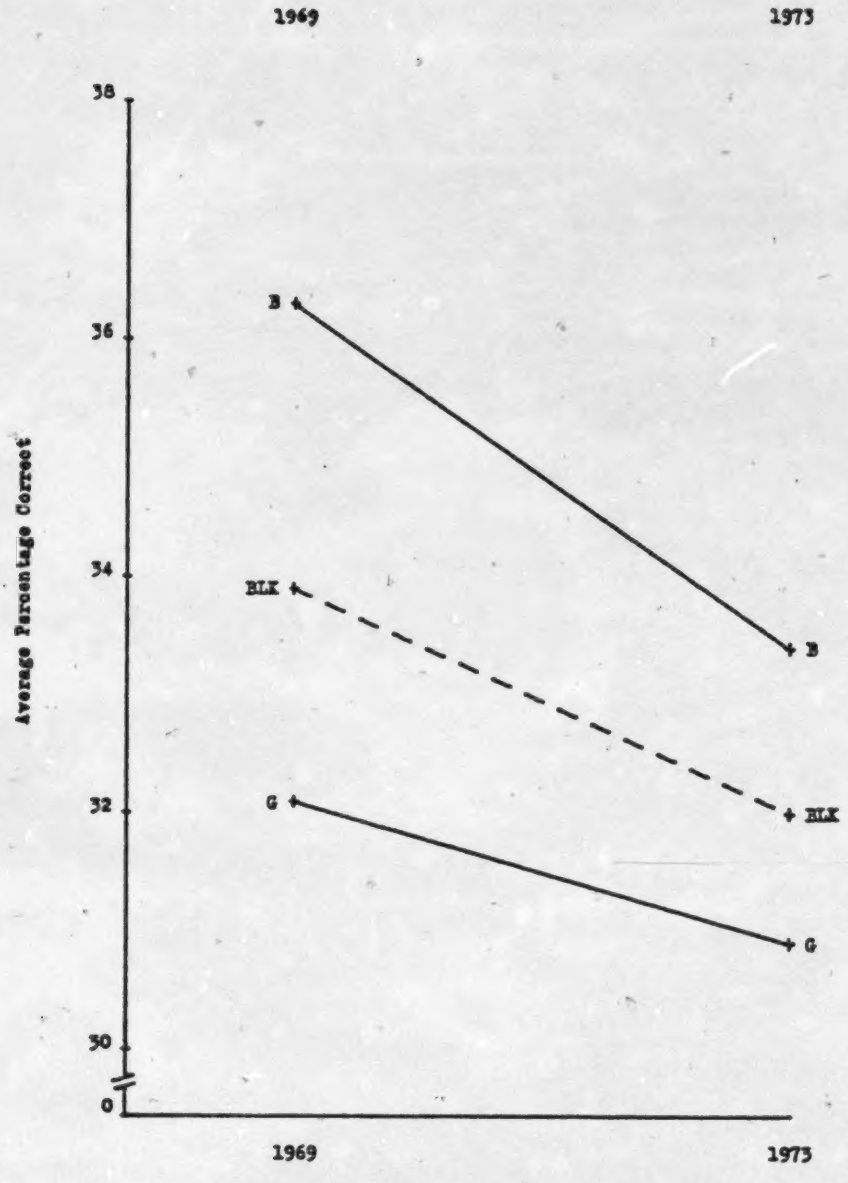
Average Percentages Correct for Black Boys and Girls
Aged 13, 1969 and 1972



BLK = Black 13-year-olds
B = Boys
G = Girls

Figure 7

Average Percentages Correct for Black Boys and Girls Aged 17, 1969 and 1973



BLK = Black 17-year-olds
B = Boys
G = Girls

Size and Type of Community Results

For each age, the average performance of the black respondents in the size and type of community categories are displayed in Figures 8, 9 and 10. Except for Low Metro 9-year-olds, the average performance of blacks in all size and type of community categories was lower in the second assessment than in the first.

At age 9, blacks attending schools in Big Cities performed above blacks in all other size and type of community categories in both assessments. But due to a relatively large decline in correct responses, down 2.5 percentage points, their advantage was smaller in 1973 than in 1970. In contrast, Low Metro 9-year-olds performed better in the second assessment than in the first. Their average performance increased 1.3 percentage points. Although their performance was the lowest in both assessments, the average difference between the Low Metro performance and that of all black 9-year-olds was smaller in the second assessment. Medium City and Small Place respondents' performance was very close to that seen for all 9-year-old blacks in both assessments.

At age 13 Big City blacks were again the highest performing groups in both assessments. Their average change in correct responses, a decline of 2.5 percentage points, was smaller than that of all black 13-year-olds. As a result its relative position increased slightly from 1969 to 1972. Blacks from Small Places also improved their relative standing, from below the average in 1969 to above the average in 1972. Medium City blacks and Low Metro blacks showed losses in their relative positions.

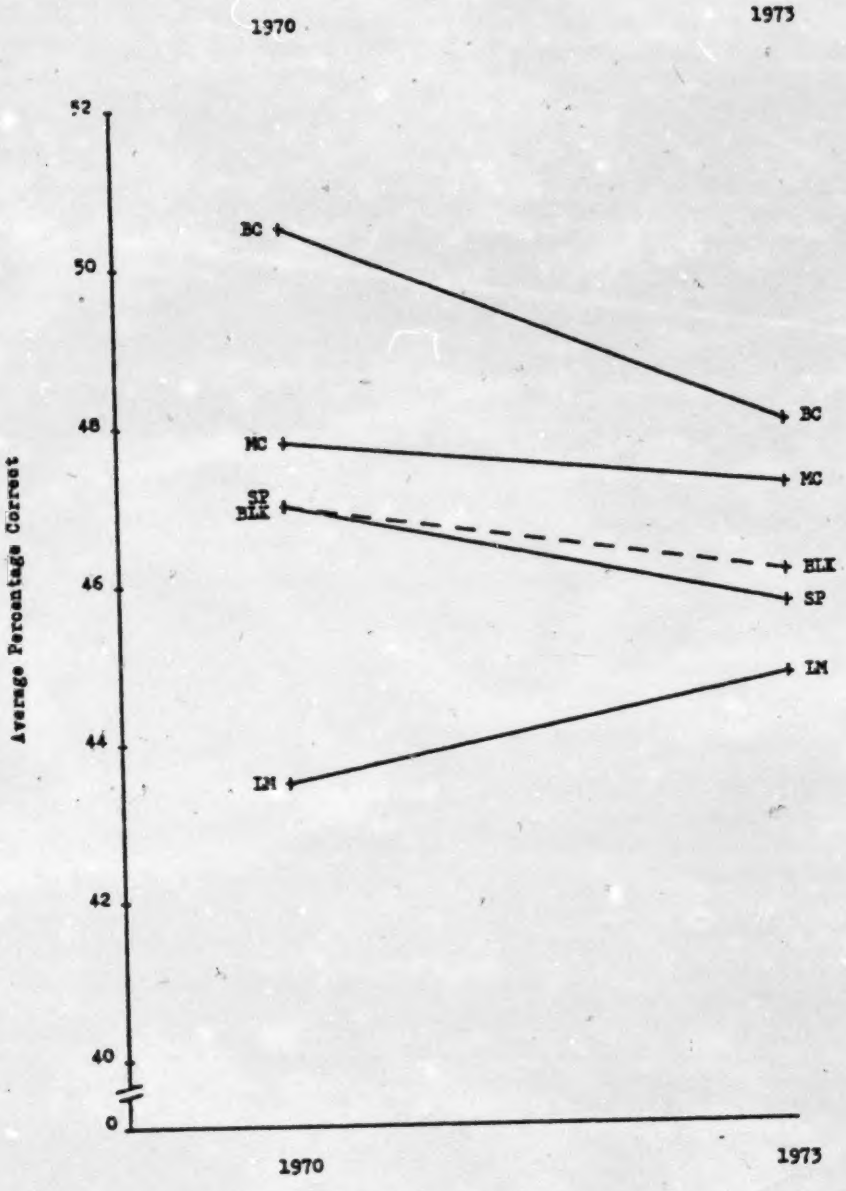
Medium City blacks although close to the average level of all blacks in 1969 slipped to slightly below average in 1972 as a result of a drop of 4.5 percentage points in correct responses. Low Metro 13-year-olds had an average decline of 6.3 percentage points causing them to be the lowest performing size and type of community category in the second assessment.

As at ages 9 and 13, 17-year-old black students attending schools in Big Cities outperformed all other size and type of communities in both assessments. Also above average in both assessments were the Medium City blacks. Seventeen-year-old blacks attending schools in Small Places were slightly below the average in 1969 but were slightly above the average in 1973, due to their relatively low drop in correct responses. Low Metro 17-year-olds had the lowest performance of the size and type of community categories in both assessments.

In general, then, blacks attending schools in the Big City category tended to perform the best of the four size and type of community groups. At ages 9 and 17 their advantage was not as large in the second assessment as it was in the first. Blacks attending Low Metro schools tended to have the lowest average percentage of correct responses in both assessments. This was true even at age 9 where Low Metro blacks showed an increase in the percentage of correct responses. Blacks in Medium Cities and Small Places performed between these two extremes, generally following trends seen for all blacks.

Figure 8

Average Percentages Correct for 9-Year-Old Blacks in Size and Type of Community Categories, 1970 and 1973



BLK = Black 9-year-olds
SP = Small Places
LM = Low Metro
MC = Medium City
BC = Big City

Figure 9

Average Percentages Correct for 13-Year-Old Blacks in Size and Type of Community Categories, 1969 and 1972

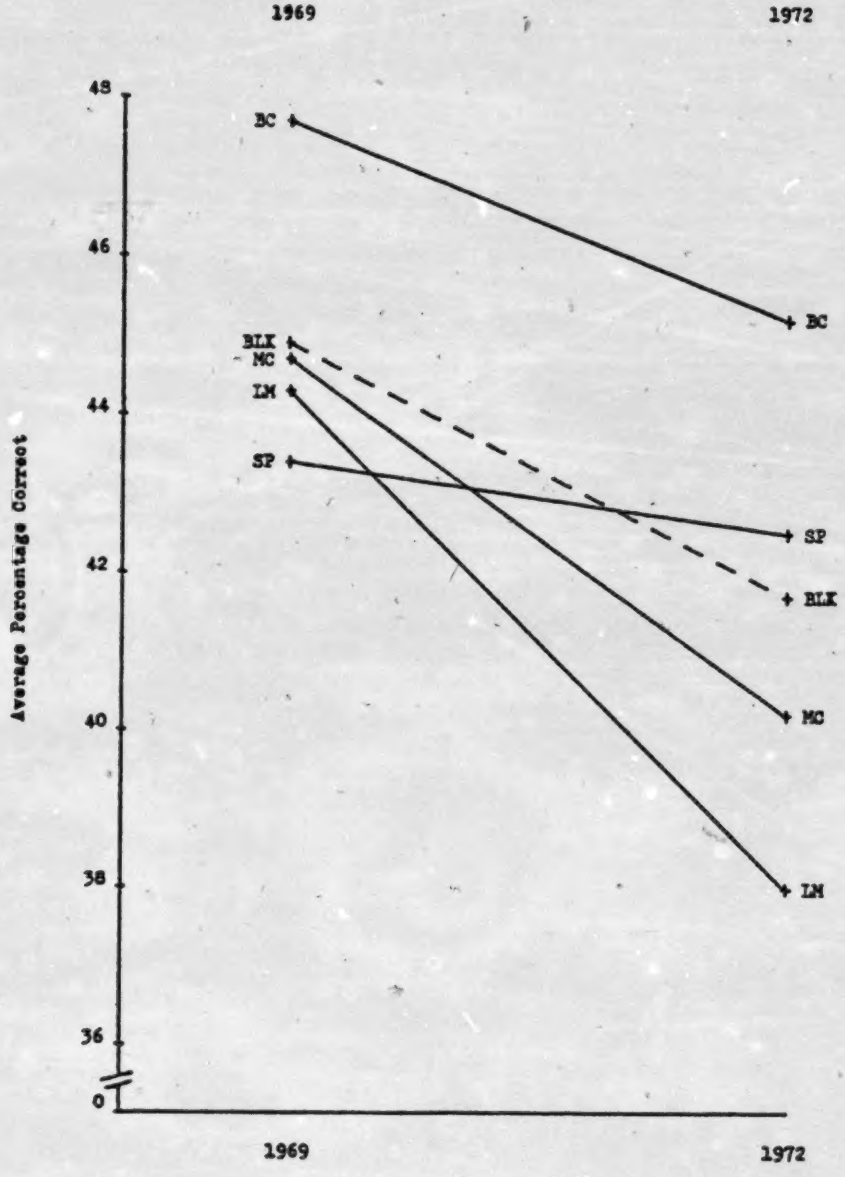
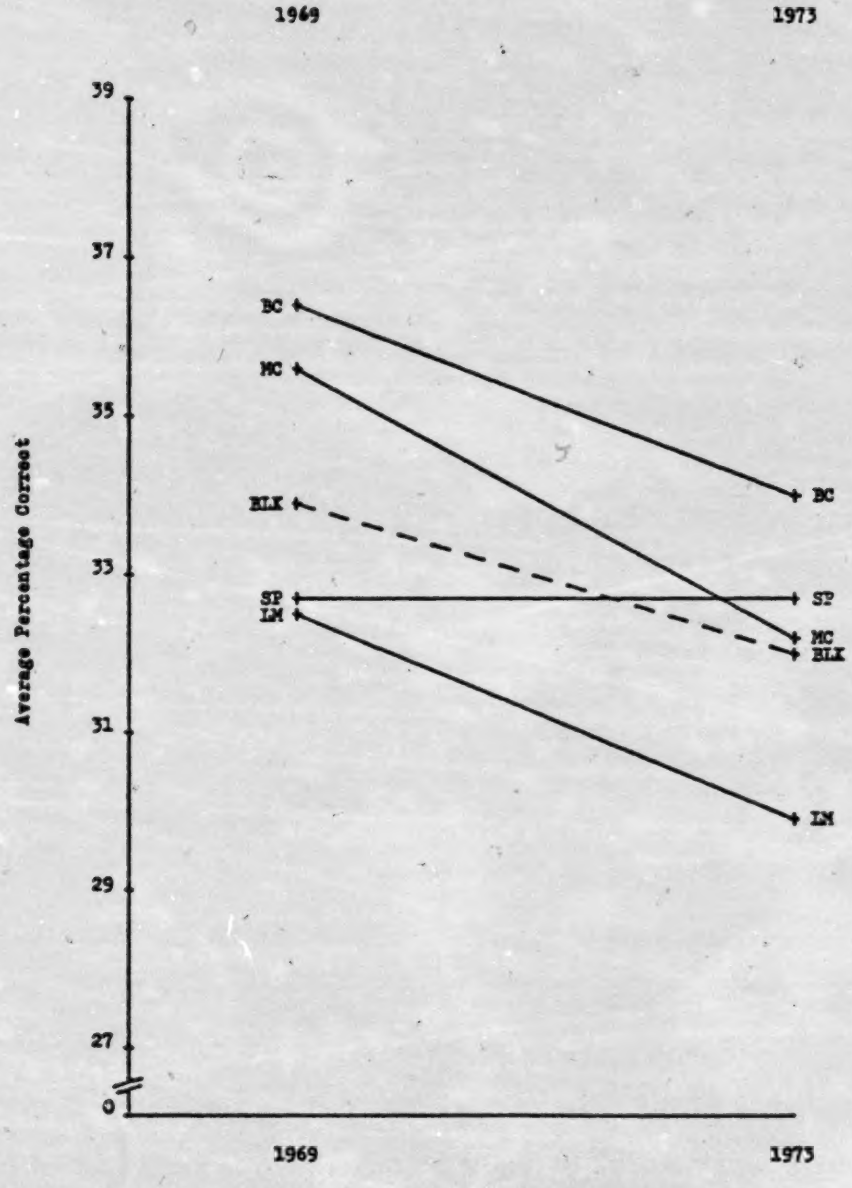


Figure 10

Average Percentages Correct for 17-Year-Old Blacks in Size and Type of Community Categories, 1969 and 1973



BLK = Black 17-year-olds
SP = Small Places
LM = Low Metro
MC = Medium City
BC = Big City

Discussion

The implications of a drop in science achievement at the national level are far reaching: Does the average citizen know enough about science to make intelligent discussions about important social and environmental issues? Are we training enough scientisits to meet the needs of our technological society? Or do the declines reflect an over-emphasis in science education during the "Sputnik" era which is just now beginning to return to more normal expectations?

Black students tended to show declines in performance that paralleled those in the nation. In addition, the difference between black performance and national performance was fairly stable between 1969 and 1973. Thus, there was little evidence of improvement in the relative position of black students in the area of science between 1969 and 1973.

The difference between black boys' and black girls' performance in science was apparent in both assessments. At ages 13 and 17 boys performed better than girls in both science assessments although both sexes showed declines in the number of correct responses from 1969 to 1973. In general, the differences between boys' and girls' performance in science tended to increase with age.

Blacks attending schools in or near big cities with 1970 population greater than 200,000 were divided into two categories: Low Metro and Big City. Blacks attending schools in Low Metro areas, characterized by high unemployment and many on welfare, consistently had the lowest performance of the four size and

type of community categories. The remainder of the blacks attending schools in or near big cities of size greater than 200,000 consistently had the highest performance in science. Blacks in Medium Cities and Small Places performed between these two extremes.

One of the most encouraging notes was the increased relative performance of Southeast blacks, typically one of the lowest performing groups. At all three ages, black students from this region improved their relatively low standing by increased performance at age 9 and by smaller declines than those of the rest of the regions at ages 13 and 17.

Although there are no definitive answers for why this group showed such gains, it is interesting to note that from 1969-70 to 1972-73 the Southeast was quickly moving toward more integrated schools following several court decisions. Other regions did not move as quickly toward integration. This is more fully explored in a recent National Assessment report, Science Achievement: Racial and Regional Trends, 1969-1973,[6] which presents regional and racial trends in science achievement for black and white students aged 9, 13 and 17 between 1969-70 and 1972-73. In addition, the report also presents changing patterns in the racial composition of schools.

[6]Background Report No. BRS-1, March, 1976, obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. A limited supply is available by writing to the authors.